

2.7 Prove Angle Pair Relationships

Theorem 2.3--All right angles are congruent

Theorem 2.4--The Congruent Supplements Theorem--

If 2 \angle s are supplementary to the same \angle (or $\cong \angle$ s) then they are \cong .

Theorem 2.5--The Congruent Complements Theorem--

If 2 \angle s are complementary to the same \angle (or $\cong \angle$ s) then they are \cong .

Prove Theorem 2.4

Given: $\angle 1$ and $\angle 2$ are supplementary

$\angle 3$ and $\angle 2$ are supplementary

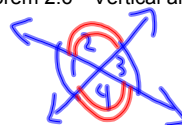
Prove: $\angle 1 \cong \angle 3$

S	R
①	① Given
② $m\angle 1 + m\angle 2 = 180$ $m\angle 3 + m\angle 2 = 180$	② def. of suppl.
③ $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	③ Subst.
④ $m\angle 1 = m\angle 3$	④ Reflexive
⑤ $m\angle 1 = m\angle 3$	⑤ Subtr.
⑥ $\angle 1 \cong \angle 3$	⑥ def of \cong

Postulate 12—The Linear Pair Postulate

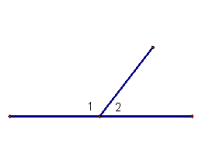
-If 2 \angle s form a Linear pair, then they are supplementary

Theorem 2.6—Vertical angles are congruent



How they are used:

Given: picture

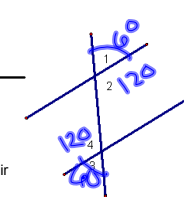


- | | |
|---|--------------------------------|
| 1. $\angle 1$ and $\angle 2$ are a linear pair. | 1. Definition of a linear pair |
| 2. $\angle 1$ and $\angle 2$ are supplementary | 2. The Linear Pair Postulate |
| 3. $m\angle 1 + m\angle 2 = 180$ | 3. Def. of supplementary |

Given: $\angle 1 \cong \angle 3$

Prove: $\angle 2 \cong \angle 4$

Statements	Reasons
1. $\angle 1 \cong \angle 3$	1. Given
2. $\angle 1$ and $\angle 2$ are a linear pair. $\angle 3$ and $\angle 4$ are a linear pair.	2. def. of linear pair
3. $\angle 1$ and $\angle 2$ are supplementary. $\angle 3$ and $\angle 4$ are supplementary	3. The Linear Pair postulate
4. $\angle 2 \cong \angle 4$	4. The \cong Supplements theorem



Given: $\angle 1$ and $\angle 2$ are supplementary Conclusion: $m\angle 1 + m\angle 2 = 180$

Reason: Definition of supplementary angles

Given: $\angle 1$ and $\angle 2$ are complementary Conclusion: $m\angle 1 + m\angle 2 = 90$

Reason: Definition of complementary angles

Given: $\angle 1$ is a right angle Conclusion: $m\angle 1 = 90$

Reason: Definition of right angles

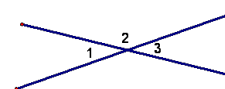
Given: $\overline{AB} \perp \overline{BC}$ Conclusion: $\angle ABC$ is a right angle

Reason: Definition of perpendicular lines

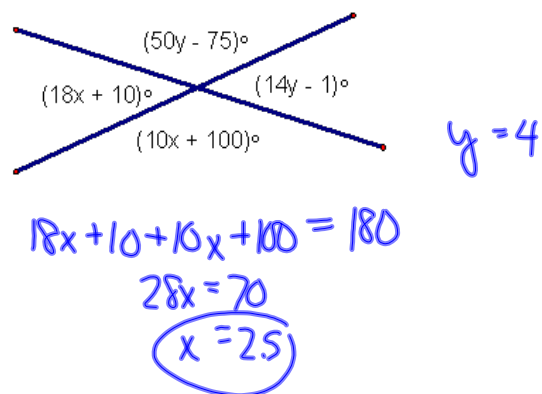
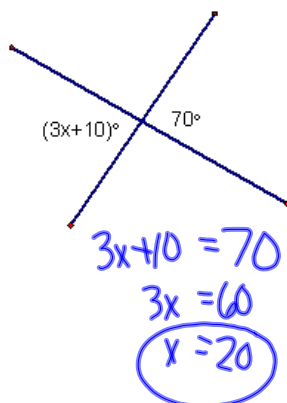
Proof of theorem 2.6:

Given: picture

Prove: $\angle 1 \cong \angle 3$



Statements	Reasons
① $\angle 1 + \angle 2$ are a linear pair $\angle 3 + \angle 2$ are a linear pair	① def of L.P. Pair
② $\angle 1 + \angle 2$ are suppl. $\angle 3 + \angle 2$ are suppl.	② Linear Pair Postulate (L.P.P.)
③ $\angle 1 \cong \angle 3$	③ \cong Suppl. thm



HW
p127-130
3, 4, 9, 11-14, 17-21, 28, 29, 38, 43